

MATHEMATICAL MODELS OF THE COMMON-SOURCE AND COMMON-GATE AMPLIFIERS USING A METAL-FERROELECTRIC-SEMICONDUCTOR FIELD EFFECT TRANSISTOR

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Mathematical models of the common-source and common-gate amplifiers using metal-ferroelectric-semiconductor field effect transistors (MFSFETs) are developed in this paper. The models are compared against data collected with MFSFETs of varying channel lengths and widths, and circuit parameters such as biasing conditions are varied as well. Considerations are made for the capacitance formed by the ferroelectric layer present between the gate and substrate of the transistors. Comparisons between the modeled and measured data are presented in depth as well as differences and advantages as compared to the performance of each circuit using a MOSFET.

Keywords: mathematical model; MFSFET; MFFET; metal-ferroelectric-semiconductor field effect transistor; FeFET; FFET; ferroelectric transistor; common-source; common-gate

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